Tom Tynan
Vice President - Vogtle

Southern Nuclear Operating Company, Inc.
7821 River Road
Waynesboro, Georgia 30830
Tel 706.826.3151
Fax 706.826 3321

June 17, 2011

Docket Nos.: 50-424

SOUTHERN COMPANY
Energy to Serve Your World℠

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

NL-11-0921

Vogtle Electric Generating Plant-Unit 1
Licensee Event Report 2011-001-00
Reactor Trip due to 1A Reactor Trip Breaker Opening

Ladies and Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(iv)(a), Southern Nuclear Operating Company (SNC) is submitting the enclosed Licensee Event Report.

This letter contains no NRC commitments. If you have any questions, please contact Doug McKinney at (205) 992-5982.

Respectfully submitted,

T. E. Tynan
Vice President – Vogtle

TET/TMH/lac

Enclosure: Unit 1 Licensee Event Report 2011-001-00

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Ms. P. M. Marino, Vice President – Engineering
Mr. M. J. Ajluni, Nuclear Licensing Director
RType: CVC7000

U. S. Nuclear Regulatory Commission
Mr. V.M. McCree, Regional Administrator
Mr. P. G. Boyle, NRR Project Manager - Vogtle
Mr. M. Cain, Senior Resident Inspector – Vogtle

Vogtle Electric Generating Plant-Unit 1
Licensee Event Report 2011-001-00
Reactor Trip due to 1A Reactor Trip Breaker Opening

Enclosure

Unit 1 Licensee Event Report 2011-001-00

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Vogtle Electric Generating Plant-Unit 1	05000 424	1 OF 4

4. TITLE
Reactor Trip due to 1A Reactor Trip Breaker Opening

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
04	20	2011	2011	- 001 -	00	06	17	2011	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE
1

10. POWER LEVEL
100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Vogtle Electric Generating Plant/Mark Hickox, Principal Licensing Engineer	706-826-4129

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On April 20, 2011 with Unit 1 operating in Mode 1 at 100 percent rated thermal power at approximately 1734 hours Eastern Daylight Time, reactor trip breaker 1A unexpectedly opened. This initiated a turbine trip and subsequent trip of the 1B reactor trip breaker. Feedwater isolation occurred on low average reactor coolant system temperature and an auxiliary feedwater system actuation occurred on low steam generator level as expected. All rods fully inserted and the plant was stabilized in Mode 3.

Extensive troubleshooting was performed to identify the cause of the 1A reactor trip breaker spuriously opening. However, the exact cause was not identified. Consequently, as a precautionary measure the reactor trip breaker, the under voltage driver card and shunt trip relay were all replaced. Additionally, recorders were installed to monitor voltages at various components in the breaker UV trip circuit in an attempt to identify the source of the spurious signal, should another trip occur.

A. REQUIREMENT FOR REPORT

This report is required per 10CFR50.73(a)(2)(iv)(A) due to an unplanned actuation of the Reactor Protection System (RPS) [JC] and an automatic actuation of the Auxiliary Feedwater System (AFW)[BA].

B. UNIT STATUS AT TIME OF EVENT

At the time of this event, Unit 1 was in Mode 1 (Power Operation) at 100 percent rated thermal power.

C. DESCRIPTION OF EVENT

On April 20, 2011 at approximately 1734 hours Eastern Daylight Time (EDT), the Unit 1A reactor trip breaker unexpectedly opened. When the 1A reactor trip breaker opened, power to the control rod drive mechanisms (CRDMs) was lost. This resulted in all rods dropping into the core. When the reactor trip breaker 1A opened, the P-4 permissive interlock initiated a turbine trip. The turbine trip with power above the P-9 permissive setpoint generated a reactor trip signal which then opened the 1B reactor trip breaker. The P-4 permissive interlock coincident with low Reactor Coolant System (RCS) [AB] average temperature (TAVG) resulted in a Feedwater (FW) [SJ] Isolation (FWI). Additionally, as a result of the reactor trip/turbine trip, water level in at least two of the steam generators (S/G) went below the low-low S/G water level nominal trip setpoint (NTS). This caused both the motor driven AFW pumps and turbine driven AFW pump to start. All equipment operated in accordance with the plant design, except for one of the steam generator atmospheric relief valves (ARV) which opened with steamline pressure below the setpoint. The operators manually closed the ARV from the control room and the opening of the valve had no adverse effect on plant response. The plant was stabilized in Mode 3 with all rods fully inserted.

In accordance with 10 CFR 50.72(b)(2)(iv)(B) for an automatic actuation of the RPS on Unit 1, a four hour non-emergency report was issued on April 20, 2011 at 20:45, Event Notification number 46772.

D. CAUSE OF EVENT

The direct cause of the reactor trip was due to reactor trip breaker 1A opening. There are two separate and independent reactor trip breakers installed in series in each unit. When either reactor trip breaker opens, power is interrupted to the CRDMs and the control rods and shutdown rods drop into the core.

The reactor trip breakers have an under voltage (UV) trip coil and a shunt trip coil installed inside the breakers that perform the tripping functions. The UV trip coil is normally energized holding its trip plunger in against spring pressure. This fail-safe design causes the reactor trip breaker to open when its UV trip coil de-energizes. When a reactor trip is processed by Solid State Protection System (SSPS) [JG] logic cards, the UV driver removes voltage from the UV trip coil and the trip plunger is released, which allows the reactor trip breaker to open.

The shunt trip relay is normally energized, which opens a contact that allows the shunt trip coil to be normally de-energized. The shunt trip coil is designed as a direct backup to the UV trip coil. When a reactor trip is processed by SSPS logic cards, the UV driver removes voltage from the shunt trip relay. This closes a contact that allows 125VDC to energize the shunt trip coil, and the plunger deflects the trip mechanism that causes the reactor trip breaker to open.

All automatic reactor trips originate from the SSPS logic cabinet. Each train of SSPS sends both a UV trip and a shunt trip to its associated train reactor trip breaker. The manual reactor trip and Safety Injection handswitches, located in the main control room, send a direct UV trip and shunt trip to both reactor trip breakers. The reactor trip handswitch located on a remote shutdown panel sends both a UV trip and shunt trip to its associated train reactor trip breaker.

Following the reactor trip, extensive troubleshooting was performed in an effort to identify the cause for the spurious opening of the 1A reactor trip breaker. Plant computer logs were reviewed and operators were interviewed. No actuation of the SSPS was identified which would account for the opening of the 1A reactor trip breaker. The reactor trip breaker, UV driver card and shunt trip relay were tested and were found to be functioning in accordance with the plant design. As a result, no definitive cause for reactor trip breaker 1A to open was found. However, as a precautionary measure, the reactor trip breaker, UV driver card and shunt trip relay were replaced. Recorders were installed to monitor voltages on various components in the breaker UV trip circuit and the unit was restarted.

One anomaly noted during the troubleshooting was the measured voltage at the UV trip coil. The UV trip coil is rated for 48 VDC. However, due to components in the circuit (Zener diode, circuit card, etc.) and as a result of a slight misadjustment of the power supply, the measured voltage at the UV trip coil was approximately 39 VDC. In order to increase the voltage at the UV trip coil, the power supply was adjusted within operating limits. This adjustment resulted in the measured voltage at the UV trip coil being increased from approximately 39 VDC to 41 VDC. Additionally, a review of the recorder traces obtained once the Unit was restarted, found that there were random short duration spikes (a few milliseconds) in which voltage at the UV trip coil dropped a couple of volts. Neither the cause of the short duration spikes nor whether these spikes contributed to the spurious opening of the 1A reactor trip breaker have been confirmed.

E. SAFETY ASSESSMENT

When the 1A reactor trip breaker unexpectedly opened, the reactor tripped and all rods fully inserted. As a result of the reactor trip, the turbine tripped, the FW system isolated and the AFW system actuated in accordance with plant design. Control room operators responded appropriately to control feedwater to the steam generators and the plant was stabilized in Mode 3. Based upon these considerations, there was no adverse effect on plant safety or on the health and safety of the public as a result of this event.

F. CORRECTIVE ACTION

Although no definitive cause for the spurious opening of reactor trip breaker 1A could be determined, as a precautionary measure the reactor trip breaker, UV driver card and shunt trip relay were replaced. Additionally, recorders were installed to monitor voltages at various components in the breaker UV trip circuit in an attempt to identify the source of the spurious signal, should another trip occur. The root cause team that was formed to investigate this issue continues to meet to analyze potential causes for the reactor trip breaker spuriously opening. Also, an independent contract team was hired to perform an independent root cause investigation. Should either root cause team identify the cause of the spurious opening, an updated LER will be submitted.

G. ADDITIONAL INFORMATION

1) Failed Components:
None

2) Previous Similar Events:
A review of Licensee Event Reports for the past three years did not identify another instance in which the reactor trip breaker opened for unknown reasons.

3) Energy Industry Identification System Code:
Plant Protection System - JC
Solid State Protection System - JG
Auxiliary Feedwater System - BA
Feedwater System – SJ
Reactor Coolant System - AB